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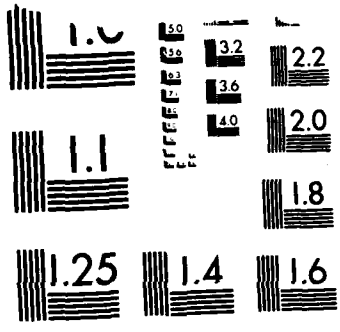

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It has been demonstrated that a material of initial composition LiAlO$_2$ will, in a wet environment, support continuous direct current in the presence of Pt electrodes at intermediate temperatures. This has been attributed to the conduction of hydroxide ions derived from the formation of LiOH. The observed behavior in this system is discussed with reference to the calculated Li-Al-O-H phase diagram. (Reprints).

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Phase Behavior in the Li-Al-O-H System at Intermediate Temperatures

by

Steven Crouch-Baker and Robert A. Huggins

Extended Abstract for a Paper to Be Presented at the
6th International Meeting on Solid State Ionics
Garmisch-Partenkirchen, September 1987

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PHASE BEHAVIOR IN THE Li - Al - O - H SYSTEM AT INTERMEDIATE TEMPERATURES

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The electrolysis of steam appears to be an attractive method for the production of hydrogen. While some effort has been devoted to the development of steam electrolysis technology operating at about 1000°C, it has been pointed out that there would be considerable thermodynamic and practical advantages in operating at intermediate temperatures (1). Recently, the results of some preliminary experiments on an hydroxid ion-conducting electrolyte which may be useful in this area have been described (2,3). It has been demonstrated that a material of initial composition Li_5AlO_4 will, in a wet environment with Pt electrodes, support continuous direct current at intermediate temperatures. This conductivity has been attributed to the presence of hydroxide ions derived from the formation of LiOH.

It has become apparent that isothermal phase diagrams, in most cases either binary or ternary, are an important tool for understanding the behavior of each of the various components of an electrochemical cell (4). In particular, it has been demonstrated how, the case of electrolytes, the appropriate ternary phase diagram may be used to predict decomposition voltages and products. The behavior of the ternary electrolyte $LiAlCl_4$, for example, has been discussed in some detail with reference to the Li-Al-Cl phase diagram (5).

In this work, the Li - Al - O - H quaternary phase diagram is constructed and used to rationalize the electrochemical and phase behavior found when using a material with an initial composition Li_5AlO_4 as an electrolyte in various environments.

Acknowledgement

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